From crankcase to gas tank: New microwave method converts used motor oil into fuel

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That dirty motor oil that comes out of your car or truck engine during oil changes could end up in your fuel tank, according to a report presented here today at the 241st National Meeting & Exposition of the American Chemical Society (ACS). It described development of a new process for recycling waste crankcase oil into gasoline-like fuel — the first, they said, that uses microwaves and has "excellent potential" for going into commercial use.

"Transforming used motor oil into gasoline can help solve two problems at once," said study leader Howard Chase, Professor of Biochemical Engineering at the University of Cambridge in the United Kingdom. "It provides a new use for a waste material that's too-often disposed of improperly, with harm to the environment. In addition, it provides a supplemental fuel source for an energy-hungry world."

Estimates suggest that changing the oil in cars and trucks produces about 8 billion gallons of used motor oil each year around the world. In the United States and some other countries, some of that dirty oil is collected and re-refined into new lubricating oil or processed and burned in special furnaces to heat buildings. Chase noted, however, that such uses are far from ideal because of concerns over environmental pollution from re-refining oil and burning waste oil. And in many other countries, used automotive waste oil is discarded or burned in ways that can pollute the environment.

Scientists thus are looking for new uses for that Niagara of waste oil,

growing in volume as millions of people in China, India, and other developing countries acquire cars. Among the most promising recycling techniques is pyrolysis, a process that involves heating oil at high temperatures in the absence of oxygen. Pyrolysis breaks down the waste oil into a mix of gases, liquids, and a small amount of solids. The gases and liquids can then be chemically converted into gasoline or diesel fuel. However, the current processes heat the oil unevenly, producing gases and liquids not easily converted into fuel.

Chase and his research team say the new method overcomes this problem and uses their new pyrolysis technology. In lab studies, his doctoral students, Su Shiung Lam and Alan Russell, mixed samples of waste oil with a highly microwave-absorbent material and then heated the mixture with microwaves. The pyrolysis process appears to be highly efficient, converting nearly 90 percent of a waste oil sample into fuel. So far, the scientists have used the process to produce a mixture of conventional gasoline and diesel.

"Our results indicate that a microwave-heated process shows exceptional promise as a means for recycling problematic waste oil for use as fuel," Chase and Lam said. "The recovery of valuable oils using this process shows advantage over traditional processes for oil recycling and suggests excellent potential for scaling the process to the commercial level."

Provided by American Chemical Society

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